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ABSTRACT

The purpose of this study was threefold: (1) to evaluate the test-retest reliability of four theoretical measures (distance, angle, vertical, and horizontal error) of the Felt Figure Replacement Technique (FFRT) (Kuethe, 1962); (2) to assess sex differences in performance accuracy for those measures found to be reliable; and (3) to examine relationships between visual-analytic abilities, as measured by the FFRT, and various personality indicies. Subjects were 49 male and 54 female undergraduate students. The FFRT task and the Eysenck Personality Inventory (Eysenck and Eysenck, 1968) were utilized. Findings indicate that: (1) of the four psychophysical measures available, the same three were reliable for both sexes; (2) both sexes made the same kind of errors relative to the standard placement; (3) females were more inaccurate on one of the three reliable measures; and (4) for females, a model combining performance scores on the reliable FFRT measures allowed for successful prediction of scores on each of the Eysenck Personality Inventory subscales. Generally, the sexes were more alike than different. Where distinctions exist, ability to coordinate the ordering of external social stimuli with internal personality mechnaisims may be an asset for females. (Author/JLL)

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More Than Meets the Eye: Spatial Visualization and Sex Differences

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Previous research on spatial aspects of visual perception has indicated a sex difference. Males generally do better on spatial visualization tasks than females. Yet tests used to measure spatial visualization (e.g., the Embedded Figures Test or the Rod and Frame Test) measure one visual ability, decontextualization, or the ability to isolate an object from its background. The relative inability of females in decontextualization, attributed to a personality quasi-trait of "field dependence," has been evaluated negatively. For instance, Witkin described the field dependent individual as "unable to keep item apart from context in a wide variety of other perceptual situations . . . Such consistency is indicative of a stylistic tendency in perception. The particular stylistic tendencies we have been considering are not limited to a persons perception; they manifest themselves in congruent form in his intellectual activities as well." (Witkin, 1968, 215-216).

We maintain that studies of sex differences in spatial visualization in this context are at least limited, and perhaps misleading as well. This assumption is based on the following premises: a) in vivo spatial visualization involves the perception and cognitive relating of several objects at the same time, while the aforementioned tests usually consider one object at a time, b) the exclusion of person-related information from such tests allows an artificial negative evaluation of females since the perception of

this type of information for females may be superior to that for males (Falbo, 1975), c) the aforementioned tests are limited to concern with recognition of an initial object in space and ignore the more interesting elements of recall and subsequent use of perceptual information.

In our research we have employed a different type of spatial visualization task, the Felt Figure Replacement Technique (FFRT) (Kuethe, 1962). The FFRT methodology requires a subject to replace a briefly observed set of figures, an "object set," cut from felt material, on a different colored felt cloth background. The figures used in the object set are often small silhouettes of human figures. In the present investigation we used a man and a woman silhouette to form the object set. It is presumed that inaccuracy in replacement reflects psychosocial needs for the subject in his/her social interactions. This technique meets our objections to earlier approaches in that: a) more than one object is involved in the perception, b) the task involves the joint use of both person- and space-related information, and c) the dependent variable of interest is recall, not recognition, of the stimulus elements.

Four measures are theoretically available for assessing replacement accuracy on this task. Distance error is the extent to which the man-woman dyad is replaced too close or too far apart in relation to the experimenter's standard placement. Angle error is the extent to which one silhouette figure is replaced above or below the other figure, thus departing from the experimenter's standard placement of the figures in a straight line along the unmarked

horizontal axis. Vertical error is the extent to which the two-figure dyad is replaced above or below the experimenter's standard placement. Horizontal error is the extent to which the two-figure dyad is replaced too far to the left or to the right of the experimenter's standard placement.

The purpose of the present investigation was threefold. First, an attempt was made to evaluate the test-retest reliability of the four theoretical measures previously mentioned. This step was necessary, in that previous use of the FFRT has been limited to an almost exclusive reliance upon the distance error alone. Secondly, we wished to assess sex differences in performance accuracy for those measures found to be reliable. Finally, we sought to examine the relationships between visual-analytic abilities, as measured by the FFRT, and various personality indicies.

Method

Subjects

A group of 103 undergraduates, 49 males and 54 females, at Oregon State University volunteered their participation in this investigation. The students were enrolled in lower division psychology coureses, and the anonymity of their results was guaranteed.

Procedure

Each subject individually completed the FFRT task once using a man-woman set of figures taken from Kuethe (1962). The background was blue felt, and the figures were cut from yellow felt. One week later the subjects returned to repeat the task. The subjects then completed Form B of the Eysenck Personality Inventory (Eysenck

& Eysenck, 1968). Distance error, angle error, vertical error, and horizontal error scores were calculated for each FFRT administration. Scale scores were determined for each of the Eysenck Personality Inventory scales; Extraversion/Introversion, Neuroticism/Stability, and Lie.

Results

For the female subjects, the test-retest reliability scores for distance error, $r(52) = .42$, $p<.01$, vertical error, $r(52) = .54$, $p<.001$, and horizontal error, $r(52) = .53$, $p<.001$, were significant. Test-retest reliability for the angle error scores was not established, $r(52) = .10$, n.s., but the lack of reliability could not be attributed to a systematic difference between the two administrations, $t(53) = -1.62$, n.s.

Exactly the same pattern held for the male subjects. Their test-retest reliability scores for distance error, $r(47) = .42$, $p<.01$, vertical error, $r(47) = .43$, $p<.01$, and horizontal error, $r(47) = .32$, $p<.05$, were significant. Again, angle error scores were not reliable, $r(47) = -.09$, n.s., but the absence of reliability could not be attributed to differences between the two administrations, $t(48) = 1.23$, n.s.

Sex differences in response patterns were checked. Taking the test-retest mean error scores, the female subjects were found to replace the figures significantly closer together than the male subjects, $F(1, 101) = 4.15$, $p<.05$. No sex differences were observed for vertical error, $F(1, 101) = .00$, n.s., or horizontal error, $F(1, 101) = .82$, n.s.

Sex similarities in response patterns were checked using the

test-retest mean scores on the three reliable FFRT measures. Both females, $t(53) = -7.43$, $p<.01$, and males, $t(48) = -4.48$, $p<.01$, replaced the figures closer together (distance error) than the standard placement. Both females, $t(53) = 5.60$, $p<.01$, and males, $t(48) = 4.74$, $p<.01$, replaced the figures higher (vertical error) than the standard placement. Neither females, $t(53) = -1.92$, n.s., nor males, $t(48) = 0.83$, n.s., replaced the figures significantly to the left or right (horizontal error) of the standard placement. The analysis suggests that males and females are basically inaccurate in the same ways on the FFRT.

Using the data from the female subjects, three linear models were generated through stepwise regression procedures. Each model combined mean scores from the three reliable FFRT measures so as to yield predictions of Eysenck Personality Inventory scale scores. One model predicted scores on the Extraversion/Introversion scale, another on the Neuroticism/Stability scale, and the third on the Lie scale. Each of the models predicted scores which were significantly related to the observed Eysenck Personality Inventory scale scores, $r(52) = .32$, $p<.05$ for the Extraversion/Introversion, $r(52) = .27$, $p<.05$ for Neuroticism/Stability, and $r(52) = .37$, $p<.01$ for Lie.

The same procedure was followed for the data obtained from the male subjects. None of the models yielded predicted scale scores which were significantly related to the observed scale scores, $r(47) = .20$, n.s. for Extraversion/Introversion, $r(47) = .15$, n.s. for Neuroticism/Stability, and $r(47) = .19$, n.s. for Lie.

Discussion

The present investigation was predicated upon the assumption that earlier investigations of visual spatialization, indicating inferior performance for females, may have presented a limited portrayal of the phemonena. It was believed that the FFRT, a spatial task involving social stimuli, might overcome some of these limitations.

It was found that: a) of the four psychophysical measures available from this task, the same three were reliable for both males and females, b) male and female groups both made the same kind of errors relative to the standard placement, c) male and female groups differed from each other on one of the three reliable measures (females were more inaccurate), but d) for females, a model combining performance scores on the reliable FFRT measures allowed for successful prediction of scores on each of the Eysenck Personality Inventory subscales.

Generally, males and females on this task were more alike than different. Where distinctions exist, ability to coordinate the ordering of external social stimuli with internal personality mechanisms may be an asset for females.

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